



Rec'd PPTC 20 SEP 2001

SEQUENCE LISTING

<110> E. I. du Pont de Nemours and Company

<120> Flavonoid Biosynthetic Enzymes

<130> BB1324 1

<140>

<141>

<150> 60/113,190

<151> 1998-12-21

<160> 10

<170> Microsoft Office 97

<210> 1

<211> 1053

<212> DNA

<213> Glycine max

<400> 1

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<210> 2

<211> 350

<212> PRT

<213> Glycine max

<400> 2

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      20                      25                      30
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Gln Leu Gly Ile Pro Asp Ile Ile Gln Asn His Ala Lys Pro Ile Thr
      35                      40                      45
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Val Ser Asp Leu Val Ser Thr Leu Gln Ile Ser Pro Ser Lys Ala Gly
      50                      55                      60
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Phe Val Gln Gln Phe Met Arg Phe Leu Ala His Asp Gly Ile Phe Asp
65 70 75 80
Ile Arg Glu Ser Gln Asp Asp His Glu Leu Ala Tyr Ala Leu Thr Pro
85 90 95
Ala Ser Lys Leu Leu Val Ser Cys Ser Asp His Cys Leu Ser Pro Met
100 105 110
Val Arg Met Asn Thr Asp Pro Leu Leu Met Thr Thr Tyr His His Phe
115 120 125
Gly Glu Trp Ile Arg Gly Glu Asp Pro Thr Val His Glu Thr Ala Phe
130 135 140
Gly Thr Ser Phe Trp Gly Leu Leu Glu Lys Asn Pro Thr Gln Met Ser
145 150 155 160
Leu Phe Asn Glu Ala Met Ala Ser Asp Ser Arg Met Val Asp Leu Ala
165 170 175
Leu Lys Asn Cys Thr Ser Val Phe Glu Gly Leu Asp Ser Met Val Asp
180 185 190
Val Gly Gly Gly Thr Gly Thr Thr Ala Lys Ile Ile Cys Glu Ala Phe
195 200 205
Pro Lys Leu Lys Cys Val Val Leu Asp Leu Pro His Val Val Glu Asn
210 215 220
Leu Thr Gly Thr Asn Asn Leu Ser Phe Val Gly Gly Asp Met Phe Asn
225 230 235 240
Ser Phe Pro Gln Thr Asp Ala Val Leu Leu Lys Trp Val Leu His Asn
245 250 255
Trp Asn Asp Glu Asn Cys Ile Lys Ile Leu Lys Lys Cys Lys Asp Ser
260 265 270
Ile Ser Ser Lys Gly Asn Lys Gly Lys Val Ile Ile Ile Asp Ile Ile
275 280 285
Ile Asn Glu Lys Leu Asp Asp Pro Asp Met Thr Arg Thr Lys Leu Ser
290 295 300
Leu Asp Ile Val Met Ser Thr Met Asn Gly Arg Glu Arg Ser Glu Lys
305 310 315 320
Glu Trp Lys Gln Met Phe Ile Glu Ala Gly Phe Lys His Cys Lys Ile
325 330 335
Phe Pro Ile Phe Gly Phe Arg Ser Leu Ile Glu Leu Tyr Pro
340 345 350

<210> 3
<211> 1160
<212> DNA
<213> Glycine max

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<400> 3
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<210> 4
<211> 358
<212> PRT
<213> Glycine max

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<400> 4
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1 5 10 15

Gly Gln Ala Leu Leu Tyr Lys His Leu Leu Gly Phe Ile Asp Ser Lys
20 25 30

Cys Leu Lys Trp Met Val Glu Leu Asp Ile Pro Asp Ile Ile His Ser
35 40 45

His Ser His Gly Gln Pro Ile Thr Phe Ser Glu Leu Val Ser Ile Leu
50 55 60

Gln Val Pro Pro Thr Lys Thr Arg Gln Val Gln Ser Leu Met Arg Tyr
65 70 75 80

Leu Ala His Asn Gly Phe Phe Glu Ile Val Arg Ile His Asp Asn Ile
85 90 95

Glu Ala Tyr Ala Leu Thr Ala Ala Ser Glu Leu Leu Val Lys Ser Ser
100 105 110

Glu Leu Ser Leu Ala Pro Met Val Glu Tyr Phe Leu Glu Pro Asn Cys
115 120 125

Gln Gly Ala Trp Asn Gln Leu Lys Arg Trp Val His Glu Glu Asp Leu
130 135 140

Thr Val Phe Glu Val Ser Leu Gly Thr Pro Phe Trp Asp Phe Ile Asn
145 150 155 160

Lys Asp Pro Ala Tyr Asn Lys Ser Phe Asn Glu Ala Met Ala Cys Asp
165 170 175

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Ser Gln Met Leu Asn Leu Ala Phe Arg Asp Cys Asn Trp Val Phe Glu
 180 185 190
 Gly Leu Glu Ser Ile Val Asp Val Gly Gly Gly Thr Gly Ile Thr Ala
 195 200 205
 Lys Ile Ile Cys Glu Ala Phe Pro Lys Leu Lys Cys Met Val Leu Glu
 210 215 220
 Arg Pro Asn Val Val Glu Asn Leu Ser Gly Ser Asn Asn Leu Thr Phe
 225 230 235 240
 Val Gly Gly Asp Met Phe Lys Cys Ile Pro Lys Ala Asp Ala Val Leu
 245 250 255
 Leu Lys Leu Val Leu His Asn Trp Asn Asp Asn Asp Cys Met Lys Ile
 260 265 270
 Leu Glu Asn Cys Lys Glu Ala Ile Ser Gly Glu Ser Lys Thr Gly Lys
 275 280 285
 Val Val Val Ile Asp Thr Val Ile Asn Glu Asn Lys Asp Glu Arg Gln
 290 295 300
 Val Thr Glu Leu Lys Leu Leu Met Asp Val His Met Ala Cys Ile Ile
 305 310 315 320
 Asn Gly Lys Glu Arg Lys Glu Glu Asp Trp Lys Lys Leu Phe Met Glu
 325 330 335
 Ala Gly Phe Gln Ser Tyr Lys Ile Ser Pro Phe Thr Gly Tyr Leu Ser
 340 345 350
 Leu Ile Glu Ile Tyr Pro
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<210> 5
 <211> 1065
 <212> DNA
 <213> Glycine max

<400> 5
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 caaattccac cagctaacgc tgcttttgtg cagcgggttca tgcgcttctt ggcacacaat 240
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 ccctcagtat ttgagacagc ccacggaaca agcgccttggg gacttcttga gaaaaatcct 480
 gaatatttta gtctcttcaa tgaggctatg gcaagtgatt cccgaatagt agacttggca 540
 ctcaaaaatt gcacttcagt ttttgagggg ctagattcca tgggtggatgt tgggtgggga 600
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 gaccttcttc atgttgtaga gaacttgaca gggaccaata atttgagttt tgttgggtgg 720
 gacatgttca actctatccc tcaagctgat gcagtgctac taaagtgggt ttacataat 780
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 ggcaacagtg gaaaagtgat tatcatagat gccgtaataa atgagaagct agatgacccg 900
 gatatgacac aaacaaagct tagtttggac attattatgt tgacgatgaa tgggaagagag 960

agaacggaaa aagaatggaa acaactcttc atcgaagcag gattcaaaca ctacaaaata 1020
 tttcccatct ttggtttttag atctctgatt gaggtctatc cttga 1065

<210> 6
 <211> 351
 <212> PRT
 <213> Glycine max

<400> 6
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 Ser Leu Leu Tyr Met Gln Leu Tyr Gly His Leu Arg Pro Met Cys Leu
 20 25 30
 Lys Trp Ala Val Gln Leu Gly Ile Pro Asp Ile Ile Gln Asn His Ala
 35 40 45
 Lys Pro Ile Ser Leu Ser Asp Leu Val Ser Thr Leu Gln Ile Pro Pro
 50 55 60
 Ala Asn Ala Ala Phe Val Gln Arg Phe Met Arg Phe Leu Ala His Asn
 65 70 75 80
 Gly Ile Phe Glu Ile His Glu Ser Gln Glu Leu Thr Tyr Ala Leu Thr
 85 90 95
 Pro Ala Ser Lys Leu Leu Val Asn Ser Ser Asp His Cys Leu Ser Pro
 100 105 110
 Met Val Leu Ala Phe Thr Asp Pro Leu Arg Asn Val Lys Tyr His His
 115 120 125
 Leu Gly Glu Trp Ile Arg Gly Glu Asp Pro Ser Val Phe Glu Thr Ala
 130 135 140
 His Gly Thr Ser Ala Trp Gly Leu Leu Glu Lys Asn Pro Glu Tyr Phe
 145 150 155 160
 Ser Leu Phe Asn Glu Ala Met Ala Ser Asp Ser Arg Ile Val Asp Leu
 165 170 175
 Ala Leu Lys Asn Cys Thr Ser Val Phe Glu Gly Leu Asp Ser Met Val
 180 185 190
 Asp Val Gly Gly Gly Thr Gly Thr Thr Ala Arg Ile Ile Cys Asp Ala
 195 200 205
 Phe Pro Lys Leu Lys Cys Val Val Leu Asp Leu Pro His Val Val Glu
 210 215 220
 Asn Leu Thr Gly Thr Asn Asn Leu Ser Phe Val Gly Gly Asp Met Phe
 225 230 235 240
 Asn Ser Ile Pro Gln Ala Asp Ala Val Leu Leu Lys Trp Val Leu His
 245 250 255
 Asn Trp Thr Asp Glu Asn Cys Ile Lys Ile Leu Gln Lys Cys Arg Asp
 260 265 270

Ser Ile Ser Ser Lys Gly Asn Ser Gly Lys Val Ile Ile Ile Asp Ala
275 280 285

Val Ile Asn Glu Lys Leu Asp Asp Pro Asp Met Thr Gln Thr Lys Leu
290 295 300

Ser Leu Asp Ile Ile Met Leu Thr Met Asn Gly Arg Glu Arg Thr Glu
305 310 315 320

Lys Glu Trp Lys Gln Leu Phe Ile Glu Ala Gly Phe Lys His Tyr Lys
325 330 335

Ile Phe Pro Ile Phe Gly Phe Arg Ser Leu Ile Glu Val Tyr Pro
340 345 350

<210> 7
<211> 1253
<212> DNA
<213> Glycine max

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gactacatac catcactttg gggaatggat tctgtgggaa gacccacagc tacatgagac 420
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cataaagatc ctgaaaaagt gttaaagattc tatttcaagc aaaggcaaca gaggaaaagt 840
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<210> 8
<211> 348
<212> PRT
<213> Glycine max

<400> 8
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Leu Tyr Gly His Leu Arg Pro Met Cys Leu Lys Trp Ala Val Gln Leu
20 25 30

Gly Ile Pro Asp Ile Ile Gln Asn His Ala Lys Pro Ile Thr Leu Ser
35 40 45

Asp Leu Val Ser Thr Leu Gln Ile Pro Pro Ser Lys Ala Gly Phe Val
50 55 60

Gln	Gln	Phe	Met	Arg	Phe	Leu	Ala	His	Asp	Gly	Ile	Phe	Asp	Ile	Arg	65	70	75	80
Glu	Ser	Gln	Asp	Asp	His	Glu	Leu	Ala	Tyr	Ala	Leu	Thr	Pro	Ala	Ser	85	90	95	
Lys	Leu	Leu	Val	Ser	Cys	Ser	Asp	His	Cys	Leu	Ser	Pro	Met	Val	Arg	100	105	110	
Met	Asn	Thr	Asp	Pro	Leu	Leu	Met	Thr	Thr	Tyr	His	His	Phe	Gly	Glu	115	120	125	
Trp	Ile	Arg	Gly	Glu	Asp	Pro	Thr	Val	His	Glu	Thr	Ala	Phe	Gly	Thr	130	135	140	
Ser	Phe	Trp	Gly	Leu	Leu	Glu	Lys	Asn	Pro	Thr	Gln	Met	Ser	Leu	Phe	145	150	155	160
Asn	Glu	Ala	Met	Ala	Ser	Asp	Ser	Arg	Met	Val	Asp	Leu	Ala	Leu	Lys	165	170		175
Asn	Cys	Thr	Ser	Val	Phe	Glu	Gly	Leu	Asp	Ser	Met	Val	Asp	Val	Gly	180	185		190
Gly	Gly	Thr	Gly	Thr	Thr	Ala	Arg	Ile	Ile	Cys	Glu	Ala	Phe	Pro	Lys	195	200		205
Leu	Lys	Cys	Val	Val	Leu	Asp	Leu	Pro	His	Val	Val	Glu	Asn	Leu	Thr	210	215		220
Gly	Thr	Asn	Asn	Leu	Ser	Phe	Val	Gly	Gly	Asp	Met	Phe	Asn	Ser	Phe	225	230	235	240
Pro	Gln	Thr	Asp	Ala	Val	Leu	Leu	Lys	Trp	Val	Leu	His	Asn	Trp	Asn	245	250		255
Asp	Glu	Asn	Cys	Ile	Lys	Ile	Leu	Lys	Lys	Cys	Lys	Asp	Ser	Ile	Ser	260	265		270
Ser	Lys	Gly	Asn	Arg	Gly	Lys	Val	Ile	Ile	Ile	Asp	Ile	Ile	Ile	Asn	275	280		285
Glu	Lys	Leu	Asp	Asp	Pro	Asp	Met	Thr	Arg	Thr	Lys	Leu	Ser	Leu	Asp	290	295	300	
Ile	Val	Met	Ser	Thr	Met	Asn	Gly	Arg	Glu	Arg	Ser	Glu	Lys	Glu	Trp	305	310	315	320
Lys	Gln	Met	Phe	Ile	Glu	Ala	Gly	Phe	Gln	His	Cys	Lys	Ile	Phe	Pro	325	330		335
Ile	Phe	Gly	Phe	Arg	Ser	Leu	Ile	Glu	Leu	Tyr	Pro					340	345		

<210> 9
 <211> 1065
 <212> DNA
 <213> Glycine max

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<400> 9
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ccagacataa tacagaacca tgccaaaccc atttctcttt ctgacttggt ctctactctt 180
caaattccac cagctaacgc tgctttttgtg cagcggttca tgcgcttctt ggcacacaat 240
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ggcaacagtg gaaaagtgat tatcatagat gccgtaataa atgagaagct agatgaccgg 900
gatatgacac aaacaaagct tagtttggac attattatgt tgacgatgaa tggaagagag 960
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<210> 10
<211> 350
<212> PRT
<213> Glycine max

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<400> 10
Ala Ser Met Asn Asn Gln Lys Glu Ile Glu Leu Phe Glu Gly Gln Ser
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Leu Leu Tyr Met Gln Leu Tyr Gly His Leu Arg Pro Met Cys Leu Lys
20 25 30

Trp Ala Val Gln Leu Gly Ile Pro Asp Ile Ile Gln Asn His Ala Lys
35 40 45

Pro Ile Ser Leu Ser Asp Leu Val Ser Thr Leu Gln Ile Pro Pro Ala
50 55 60

Asn Ala Ala Phe Val Gln Arg Phe Met Arg Phe Leu Ala His Asn Gly
65 70 75 80

Ile Phe Glu Ile His Glu Ser Gln Glu Leu Thr Tyr Ala Leu Thr Pro
85 90 95

Ala Ser Lys Leu Leu Val Asn Ser Ser Asp His Cys Leu Ser Pro Met
100 105 110

Val Leu Ala Phe Thr Asp Pro Leu Arg Asn Val Lys Tyr His His Leu
115 120 125

Gly Glu Trp Ile Arg Gly Glu Asp Pro Ser Val Phe Glu Thr Ala His
130 135 140

Gly Thr Ser Ala Trp Gly Leu Leu Glu Lys Asn Pro Glu Tyr Phe Ser
145 150 155 160

Leu Phe Asn Glu Ala Met Ala Ser Asp Ser Arg Ile Val Asp Leu Ala
165 170 175

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Leu	Lys	Asn	Cys	Thr	Ser	Val	Phe	Glu	Gly	Leu	Asp	Ser	Met	Val	Asp	
			180					185					190			
Val	Gly	Gly	Gly	Thr	Gly	Thr	Thr	Ala	Arg	Ile	Ile	Cys	Asp	Ala	Phe	
		195					200					205				
Pro	Lys	Leu	Lys	Cys	Val	Val	Leu	Asp	Leu	Pro	His	Val	Val	Glu	Asn	
	210					215					220					
Leu	Thr	Gly	Thr	Asn	Asn	Leu	Ser	Phe	Val	Gly	Gly	Asp	Met	Phe	Asn	
225					230					235					240	
Ser	Ile	Pro	Gln	Ala	Asp	Ala	Val	Leu	Leu	Lys	Trp	Val	Leu	His	Asn	
			245						250					255		
Trp	Thr	Asp	Glu	Asn	Cys	Ile	Lys	Ile	Leu	Gln	Lys	Cys	Arg	Asp	Ser	
			260					265					270			
Ile	Ser	Ser	Lys	Gly	Asn	Ser	Gly	Lys	Val	Ile	Ile	Ile	Asp	Ala	Val	
		275					280					285				
Ile	Asn	Glu	Lys	Leu	Asp	Asp	Pro	Asp	Met	Thr	Gln	Thr	Lys	Leu	Ser	
	290					295					300					
Leu	Asp	Ile	Ile	Met	Leu	Thr	Met	Asn	Gly	Arg	Glu	Arg	Thr	Glu	Lys	
305					310					315					320	
Glu	Trp	Lys	Gln	Leu	Phe	Ile	Glu	Ala	Gly	Phe	Lys	His	Tyr	Lys	Ile	
			325						330					335		
Phe	Pro	Ile	Phe	Gly	Phe	Arg	Ser	Leu	Ile	Glu	Val	Tyr	Pro			
			340					345					350			